Citation:

Lee Y, Mitchell DC, Smickiklas-Wright H, Birch LL. Diet quality, nutrient intake, weight status, and feeding environments of girls meeting or exceeding recommendations for total dietary fat of the American Academy of Pediatrics. *Pediatrics* 2001; 107: e95.

PubMed ID: 11389293

Study Design:

Prospective Cohort Study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

- To compare girls' diets that had more than 30% of energy from fat with those meeting the American Academy of Pediatrics (AAP) recommendations to maintain dietary fat intake at no more than 30% of energy. Specifically, girls' food intake, nutrient intakes, diet quality, body mass index (BMI) and skinfold thickness were compared for the two groups.
- To evaluate relationships between girls' dietary fat intake, maternal nutrient intakes and mothers' child-feeding practice
- To investigate whether mothers of girls whose diets met the AAP guidelines were more likely to meet dietary recommendations themselves and whether they were more likely to report using child-feeding strategies to foster healthy diets in their daughters than were mothers of girls whose diets did not meet the guidelines.

Inclusion Criteria:

- Families with age-eligible female children within five-county radius
- Girls living with both biological parents
- Absence of severe food allergies or chronic medical problems affecting food intake
- Absence of dietary restrictions involving animal products.

Exclusion Criteria:

Girls who had less than 20% of energy from fat.

Description of Study Protocol:

- Girls and their mothers were participating in a longitudinal project investigating development of controls of food intake and dieting of girls

- Weight status and skinfold measurements were taken at study onset and after two years duration.

Data Collection Summary:

Dependent Variables

- BMI at age five and seven years (kg per m^2 from measured height and weight)
- Change in BMI from age five to seven years
- Skinfold measurements: Sum of triceps and subscapular skinfold measurements (measured on right side of body using Harpenden calipers) (Harrison).

Independent Variables

- Girls' dietary intake: Three 24-hour recalls averaged, conducted with mothers in the presence of their daughters; analyzed using Nutrition Data System, Version 2.6, University of Minnesota Nutrition Coordinating Center
- Girls with greater than 30% of energy from fat vs. girls [high fat (HF)] vs. girls with less than 30% of energy from fat [low fat (LF)]
- Energy
- Nutrient Intake
- Number of servings from grains, vegetables, fruits, dairy, meat, fats and sweets food groups
- Healthy Eating Index: Maximum score of '10' on components of index were closer to recommended ranges or amounts
- Mothers' dietary intake in previous three months: FFQ (Kristal)
- Maternal control in child feeding: Child Feeding Questionnaire
- Monitoring: Extent to which mothers oversee their child's eating
- Restriction: Extent to which mothers restrict their child's access to foods
- Pressure to eat: Mothers' tendency to pressure their children to eat more food.

Control Variables

BMI at age five years.

Statistical Analysis

- Analysis of Variance (ANOVA): To compare food group intakes, weight status and maternal feeding practices girls consuming HF versus LF diets
- Analysis of Covariance (ANACOVA): To compare LF and HF groups in girls' and mothers' nutrient intakes controlling for energy intake
- Pearson correlation analyses: To assess relations of girls' fat intake (percent of energy intake) to girls' weight status, mothers' fat intake and mothers' feeding practices.

Description of Actual Data Sample:

- *Original sample:* 197 five-year old girls and their mothers (Age 35.4±0.3 years; Education 15±2 years)
- *Withdrawals/Drop-outs:* Five girls who had less than 20% of energy from fat were excluded from the analysis
- *Final sample:* 192 White girls age five at baseline and their mothers; followed for two years.
- *Location:* Pennsylvania

- *Race/Ethnicity:* 99% White
- *SES:* Middle-upper-middle class
- *Age:* Five years at baseline and seven years at follow-up.

Summary of Results:

Cross-sectional Results

Girls' Energy and Fat Intake

- Mean energy intake = 1526kcal (84.8% of recommended dietary allowances)
- 45% of girls consumed diets with less than 30% of energy from fat (LF) (N=84) vs. HF (at least 30% kcal) (N=108).

Demographic Information by Fat Intake Level

No significant differences between LF and HF groups, respectively for:

- Education: Average 15 years for both
- Household income: 73.5% and 70.4% had incomes more than $35,000
- Percentage of working mothers: 62% and 64%.

Girls' Food Group Intake by Fat Intake Level

- Compared to girls on LF diets, girls on HF diets consumed significantly more servings of fats, sweets and meat; girls in both groups consumed less than recommended two servings per day ($P < 0.05$)
- Servings of grains: NS between HF and LF groups
- Servings of fruit: LF=1.8 vs. HF=1.3 ($P<0.05$)
- Servings of vegetables: NS between HF (1.5) and LF (1.7); only ~ 8% of girls consumed recommended number of servings
- Dairy: NS between HF and LF; girls in both groups consumed more servings of dairy foods than the recommended two servings per day.

Healthy Eating Index (HEI)

- Total HEI scores of both groups corresponded to "a diet that needs improvement," but scores for both groups were higher than those reported for US girls of the same age
- LF had significantly higher HEI scores than HF, even when excluding fat subscales

Girls' Energy and Nutrient Intake by Fat Intake Level

- Energy intake: NS between HF and LF (trend for higher in HF)
- Carbohydrate intake: Higher for LF (233±1.6g) than HF (205±1.4g) ($P<0.05$)
- Protein intake: NS
- Fiber: LF (11.8±0.3g) greater than HF (10.1±0.3g) ($P<0.05$)
- Micronutrients: LF had significantly ($P<0.05$) higher intakes of vitamins A, C, thiamin, B_6, folate, and niacin and of iron and magnesium.

Girls' Weight Status by Fat Intake Level

No significant differences in BMI between groups at five or seven years old.

Mothers' Feeding Practicies by Girls' Fat Intake Level

- Maternal restriction and pressure to eat scores were higher for mothers of girls in HF than LF group
- Relationship between mothers' feeding practices and girls' macronutrient intake, controlling for girls' BMI:
  - Maternal restriction (r=0.17; P=0.01) and pressure to eat (r=0.16; P=0.02) were positively related to girls' percentage total energy from fat
  - Carbohydrate, protein and energy intake were not related to mothers' feeding practices.

Mothers' Energy and Nutrient Intakes by Girls' Fat Intake Level

- Mothers of girls in the HF group consumed more fat (75±0.13g) and less carbohydrates (216±3.5g) than mothers of girls in the LF group (70±1.5g fat; 227±4.0g CHO)
- Energy and protein intakes were NS
- LF group mothers had greater fiber intakes (16.3±0.6g) than HF group mothers (14.4±0.5g)
- Mothers' and daughters' fat intake (percent of kcal): r=0.31; P=0.0001
- Mothers' and daughters' energy intake: r=0.15; P=0.03
- Mothers' and daughters' carbohydrate intake: r =0.21; P=0.003
- Mothers of girls in the LF group had higher intakes of vitamins A, C, riboflavin, folate and magnesium (P<0.05)
- Calcium intakes were higher in mothers of girls consuming LF diets (P<0.05)
- Pattern of differences in nutrient intakes for mothers of girls in HF and LF groups were similar to those noted for their daughters.

Longitudinal Results

Weight Status by Fat Intake Level

- Change in BMI from five to seven years of age was significantly greater for girls on HF diets than LF and the same result was obtained when controlling for BMI at age five years
- Change in sum of skinfold thickness (sum of triceps and subscapular) was also significantly higher in HF group than in the LF group. Girls who consumed relatively more energy from fat at age five years gained more subcutaneous fat from ages five to seven years.
- Fat intake (% of energy intake) was positively correlated with change in BMI from ages five to seven years (r=0.14; P<0.05), whereas carbohydrate intake was negatively related to change in BMI from ages five to seven years (r=-0.19; P<0.01).

Author Conclusion:

- Fat intake influenced girls' change in weight status. Although girls consuming High Fat and Low Fat diets did not differ in weight status at either five to seven years of age, girls consuming High Fat diets showed significantly greater increases in both BMI and skinfold thickness from five to seven years of age. Girls consuming Low Fat diets had slightly but not significantly lower energy intakes than girls on High Fat diets.
- These findings suggested that the use of restriction and pressure in child feeding are ineffective and counter-productive in bringing children's diets into line with current AAP recommendations.

Reviewer Comments:

Strengths:

- *Longitudinal nature*
- *Well controlled study.*

Limitations:

Sample that is exclusively White, well-educated two-parent families – GIRLS only.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions		
1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	Yes
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A
Validity Questions		
1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	No

3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	Yes
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A

5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	Yes
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes

	8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
	8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
	8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
	8.6.	Was clinical significance as well as statistical significance reported?	Yes
	8.7.	If negative findings, was a power calculation reported to address type 2 error?	Yes
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**		Yes
	9.1.	Is there a discussion of findings?	Yes
	9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**		Yes
	10.1.	Were sources of funding and investigators' affiliations described?	Yes
	10.2.	Was the study free from apparent conflict of interest?	Yes